



NASA STTR 2010 Phase I Solicitation

T8.01 Flexible Charge Dissipation Coatings for Spacecraft Electronics

Lead Center: LaRC

Participating Center(s): JPL

Many NASA spacecraft and satellites operate in radiation environments: geostationary and medium earth orbits, radiation belts in the outer planets, solar wind, and Lagrangian points near the sun. With highly charged particles that penetrate spacecraft, internal electrostatic discharge risks mission assurance. The Jovian environment has radiation levels 7 times greater than Earth's geostationary orbit, which is the NASA Europa Jupiter System Mission environment. In order to reduce the risk of internal electrostatic discharge on sensitive spacecraft electronic components, NASA seeks a conformal conductive coating that dissipates charge on the surface of electronic boards. It is highly desired for the coating to be applied to electronic boards using a standard industry method such as painting or other brush technique in a cleanroom environment. The coating must dissipate charge, have low outgassing, and have low water absorption. The coating is highly desired to be optically clear for visual inspection of components. The coating is also highly preferred to be thermoplastic for removal if needed. The minimum maximum service temperature for the coating is 70 deg C. Charge dissipation testing can be done using electron gun, which can be screened using a scanning electron microscope (SEM). At the macroscopic level, the volume resistivity of the conductive coating must be in the range of 1×10^8 - 10^{12} ohm cm. The paint or coating must be able to adhesively bond to conventional electronic epoxy and polyimide circuit boards without damaging metal circuits, resistors, capacitors, and semiconductor surfaces. Improved charge dissipation supports the mission assurance of NASA satellites and spacecraft that operate in charging environments.